

Unit 4.0 Review

1. Evaluate.

a. $6^2 \times 6^3 = \underline{7776}$

$(\frac{1}{2})^2 \times (\frac{1}{2})^3 = \underline{0.03125}$

$(1)^5 \times (1)^3 = \underline{1}$

b. $5^3 \times 5^5 = \underline{390625}$

$(\frac{1}{3})^2 \times (\frac{1}{3})^1 = \underline{0.0370}$

$(2)^3 \times (2)^4 = \underline{128}$

c. $1^2 \times 1^4 = \underline{1}$

$(\frac{1}{4})^3 \times (\frac{1}{4})^2 = \underline{0.000976}$

$(3)^1 \times (3)^5 = \underline{729}$

2. Write as a "**SINGLE POWER**" then, evaluate.

a. $2^8 \div 2^5 = \underline{2^{8-5} = 2^3}$
 $\underline{= 8}$

$(\frac{1}{4})^3 \div (\frac{1}{4})^1 = \underline{(\frac{1}{4})^{3-1} = (\frac{1}{4})^2}$
 $\underline{= 0.0625}$

$(2)^7 \div (2)^3 = \underline{2^{7-3} = 2^4}$
 $\underline{= 16}$

b. $3^5 \div 3^2 = \underline{3^{5-2} = 3^3}$
 $\underline{= 27}$

$(\frac{1}{3})^5 \div (\frac{1}{3})^3 = \underline{(\frac{1}{3})^{5-3} = (\frac{1}{3})^2}$
 $\underline{= 0.11}$

$(1)^8 \div (1)^5 = \underline{1^{8-5} = 1^3}$
 $\underline{= 1}$

c. $\frac{5^4}{5^{-2}} = \underline{5^{4-(-2)}} = \underline{5^6}$
 $\underline{= 15625}$

$\frac{5^{-2}}{5^{-5}} = \underline{5^{-2-(-5)}} = \underline{5^3}$
 $\underline{= 125}$

$\frac{4^{-4}}{4^2} = \underline{4^{-4-2}} = \underline{4^{-6}}$
 $\underline{= 0.00024}$

3. Evaluate.

d. $(2^3)^2 = \underline{64}$

$(3^2)^2 = \underline{81}$

$(\frac{1}{2}^4)^1 = \underline{0.0625}$

e. $(1^3)^2 = \underline{1}$

$(2^2)^4 = \underline{256}$

$(\frac{1}{4}^2)^3 = \underline{0.00024}$

c. $7^0 = \underline{1}$

$43^0 = \underline{1}$

$(1)^0 \times (1)^0 = \underline{1}$

d. $2^{-3} = \underline{\frac{1}{2^3}}$
 $\underline{= 0.125}$

$5^{-5} = \underline{\frac{1}{5^5}}$
 $\underline{= 0.00032}$

$50(6)^{-3} = \underline{50(\frac{1}{6^3})}$
 $\underline{= 0.23148}$

4. Fill in the following Table.

Exponent Form	6^3	5^{-1}	10^0	65^{-3}	3^{-1}	100^0	4^{-n}	5^{-m}	12500000^0
Simplified Form	216	$\frac{1}{5}$	1	$\frac{1}{65^3}$	$\frac{1}{3}$	1	$\frac{1}{4^n}$	$\frac{1}{5^m}$	1

5. a) Complete a table of values for each:

$y = 2x$		1 st	2 nd	$y = 2^x$		1 st	2 nd	$y = x^2$		1 st	2 nd
-2	-4	—		-2	0.25	—	—	-2	4	—	—
-1	-2	$-2 - (-4) = 2$		-1	0.50	$0.50 - 0.25 = 0.25$	—	-1	1	$1 - 4 = -3$	—
0	0	$0 - (-2) = 2$		0	1	$1 - 0.50 = 0.50$	0.25	0	0	$0 - 1 = -1$	$-1 - (-3) = 2$
1	2	$2 - 0 = 2$		1	2	$2 - 1 = 1$	0.50	1	1	$1 - 0 = 1$	$1 - (-1) = 2$
2	4	$4 - 2 = 2$		2	4	$4 - 2 = 2$	1	2	4	$4 - 1 = 3$	$3 - 1 = 2$
3	6	$6 - 4 = 2$		3	8	$8 - 4 = 4$	2	3	9	$9 - 4 = 5$	$5 - 3 = 2$

b) Describe any patterns you see. Quadratic, Exponential or Quadratic

$y = 2x$ linear — 1st differences are constant
 $y = 2^x$ exponential — multiplication pattern
 $y = x^2$ quadratic — 2nd differences are constant.

6. For each exponential relation, describe its characteristics:

a. $y = 3^x$

x-intercept: none

y-intercept: 1

increasing or decreasing

c. $y = 0.05^x$

x-intercept: none

y-intercept: 1

increasing or decreasing

b. $y = 2.5^x$

x-intercept: none

y-intercept: 1

increasing or decreasing

d. $y = 0.2^x$

x-intercept: none

y-intercept: 1

increasing or decreasing

Word Problems:

- The population of Mathville is 21 000. Each year, the population increases at a rate of 2.4%. What is the equation? What is the y-intercept?

equation: $P(n) = 21000(1 + 0.024)$

y-intercept: 21000

2. The price of a new car is \$25 001. Its value depreciates by 15% each year. What is the depreciated value of the car after 5 years? What is the y-intercept?

$$P(n) = 25001(1 - 0.15)^5$$

$$= 11093.08$$

∴ the car's value is \$11093.08 after 5 years.
the y-intercept is 25001

3. The hydrogen isotope tritium is radioactive, with a half-life of 5 years. A sample contains 35.2 units of radioactive tritium. What amount would remain after 25 years? What is the y-intercept?

$$P(n) = 35.2(1 - 0.50)^5$$

$$= 1.1$$

∴ there would be 1.1 units remaining after 25 years. The y-intercept is 35.2 units

4. In Canada the population of children in the age group 0–14 years has been increasing by 10% per year. The population of this age group in 2007 was about 6 017 000, Write an exponential function to model this population growth. What is the y-intercept?

$$\rightarrow P(n) = 6017000(1 + 0.1)^x$$

$$y\text{-intercept} = 6017000$$

5. The population of Newfoundland has been increasing at an annual rate of 0.8%. The population in 1999 was about 541 000.
- a. Write an exponential function to model the population increase of Newfoundland.

$$P(n) = 541000(1 + 0.008)^x$$

- b. Use the exponential function to predict the population of Newfoundland in the year 2025.

$$P(n) = 541000(1 + 0.008)^{26}$$
$$= 665535.31$$

∴ the population would be 665535 people.